Modern Classroom Design: A Study on Interactive Learning

An Honors Thesis (ARCH 401)

by

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Abstract

Designing a classroom that can keep up with our continuously advancing technologies has been a difficult task for past designers. Numerous studies have focused on educational facilities and their variety of teaching techniques within these designed spaces. The classroom becomes far more than an independent learning setting, but an interactive, social network. The students not only collaborate and interact with their fellow classmates, but with the building itself. Learning becomes more than just reading a book or writing a paper, but an everyday observation and interaction with our surrounding environment. The students are able to experience the interworking of the school and begin to develop an understanding of the world around them. The school becomes a teaching tool in itself. I have researched interactive learning and its positive trend in modern classroom design.

Acknowledgements

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I would like to thank my studio professor, Robert Fisher, for helping me to continuously develop my designs and for encouraging a hard work ethic.

Author's Statement

My Senior Honors Thesis investigates modern classroom design and the importance of integrated interaction and collaboration. I have researched many experiments and precedent studies, such as, Harbor City International School and Fort Herriman Middle School that also focused on enhancing learning environments. Their design intents and solutions seemed to be very similar to my overall vision of a successful classroom. My project directly focuses on the interaction between students and their surrounding environment. I experimented with the flexibility inside of the classroom and a variety of spaces that could be designed for specific functions. The final framework of my project includes an informative booklet of the research that I have developed through my design stages. This will help to outline my process of thinking during this project in a very elaborate and understanding manner. I have also produced computer-generated images and a physical model of the classrooms that I have envisioned. With this, my work has taken on two-dimensional and three-dimensional forms, creating a well-rounded development.

I became especially interested in this topic of focus while engaged at Ball State University. I have completed classes within the College of Architecture and Planning that have focused specifically on "designing for people". Classroom design became an easy target for this theme and one that I am very familiar with myself. It is evident that learning environments do not always provide ideal conditions for successful learning. This struggle of design and innovation is one that inspired me to personally become involved. I believe that it is very important that all people become educated on this topic and inspired to take their own step to make a difference.

MODERN CLASSROOM DESIGN:
A STUDY ON INTERACTIVE LEARNING

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Where Have We Gone Wrong?

Oftentimes, learning environments do not provide ideal conditions for successful and comfortable learning. Schools function as a student's "place of work" and should be designed accordingly. Students should be able to sit comfortably within their learning space with a clear mind and a strong will to learn. Their surroundings should not hinder their abilities or cause them to feel unmotivated.

Classroom design seems like an impossible challenge to keep up with, but designers must develop their talents and techniques to evolve with this movement. Technology is advancing at full speed, while classroom development is lagging behind. Each year in the United States, 30 billion dollars is allocated to school construction (Fielding, 2005). Educational facilities become the foundation of all knowledge and growth in our society.

"Learning should be viewed as a systematic process. It must be fostered in each facet of a business or organization: in people and structures, in business or operational processes, in technological support, and in the physical space." (Steelcase, 2000)

"The lives of hundreds of thousands of students, not to mention tens of thousands of teachers and other staff, are profoundly affected by the learning environment" (Fielding, 2005). So, why does it feel like we are being isolated from all social interaction during the hours that we are spending inside of the classroom? I know that I often feel as though I am trapped inside of a dungeon. If learning environments seem to be such a big deal for our future, then why aren't we designing in a way that engages learning? Why are classrooms always the standard rectangular shape? Can a static form adapt to the functioning of each and every school subject and audience? In this case, function has been squeezed into the form, instead of form following function. Classrooms should be a top priority of all designers and a constant challenge to improve on old traditions. It is time that we consider the importance of classrooms and their overall effects on our future.

"The Traditional Classroom"

Traditional classrooms, those most commonly found in schools today, are outdated in form and function. The static and repetitive form of these classrooms was originally intended to provide a very strict and focused working environment. Students were to attend school to achieve a solid education and that was all. There was no focus on collaboration or interaction. Then, classrooms functioned as an atmosphere of independent work with the elimination of unwanted distractions. Most of these "traditional classrooms" were designed in the 1960s or earlier. They were built for lecturing, not for learning.

The absence of flexibility within these classrooms hindered collaboration between classmates and even collaboration with their own environment. Primarily, the spaces were very static. They were usually rectangular in form with very few windows, a blackboard, and perfectly-aligned rows of desks and chairs. The materials were very plain and the furnishings were very bleak. Fixed furniture limited the amount of movement that was possible, constraining the relationship between instructors and students. These spaces encouraged children to acquire a sense of obedience and independence. Along with acquiring these characteristics, children should also learn the benefits of fellowship and community.

Figure 1.1: Photo of the "Traditional Classroom" (Lockton, 2011)

The Studio: Personalized Space

I was personally subjected to these static classrooms all throughout elementary school, middle school, and high school. At that point in time, I was very unaware of the hindrances of my classroom. I later enrolled in Ball State University's College of Architecture and Planning and was introduced to the idea of a "studio".

Figure 1.2: Photos of my studio

It was here that I realized the importance of flexible spaces. The studios provided a very collaborative atmosphere that was perfect for group projects. You were able to cluster your desks into appropriate groupings or separate yourself from others, if preferred. Your studio desk became your "home away from home" and the ability for personalization of space became essential. I was able to learn in an atmosphere that was adapted to my own needs. I acquired a feeling of freedom when I was at my studio desk. I believe that each classroom should provide a similar opportunity for its students today in all learning environments. I finally began to know how to work in groups and exchange ideas with others. My socialization skills became more advanced even when I was sometimes tentative to the exposure. This interaction has led me to the creation of many great design ideas and some of the best relationships of my college career. College seems a little late for this development!

Role of the Architect in the Classroom

The success of the classroom is often correlated directly with the teacher, while the responsibility of the architect is undermined in this relationship. The architect is the creator of the environment who inevitably affects whether the space functions correctly or incorrectly. They must decide how the classroom should be partitioned, whether it is with walls, railings, or furniture. Are there windows on the south wall or the east wall, or both? Can you see the structural frame of the building or is the room completely finished in drywall? These are important decisions that architects must make when designing educational spaces.

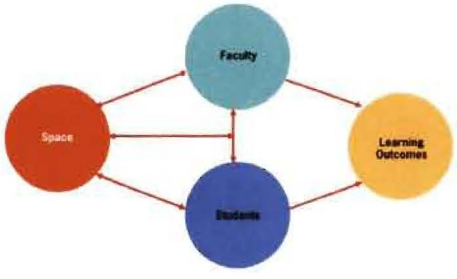

Figure 1.3: Illustration of process and collaboration within a learning environment (Hunley, 2009)

We often overlook these design elements when we are sitting at our desk doing our homework, that is, until we notice that the glare off of our paper is overwhelming or that we need more work space for our supplies. Can we actually learn from these designs while we are sitting in the classroom? How can observation and interaction with our surroundings help to stimulate learning and education? Our built environment affects our routine at all times of the day, so designers must carefully plan the details that they do have control over.

Studies on Interactive Learning

Modern classroom design often focuses on the idea of collaborative or interactive learning. Interactive learning is defined as an environment that supports structured interaction between a community of learners (Cox, 2004).

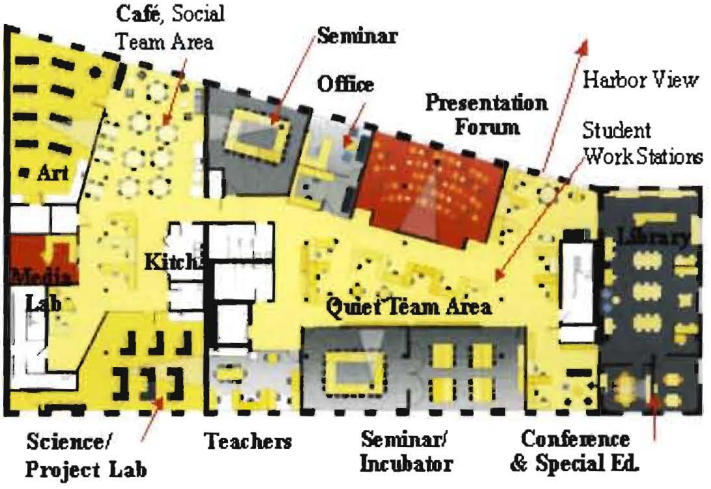

Figure 1.4: Harbor City International School diagram (Fielding, 2005)

How do we know that interactive learning is successful? Has interactive learning been proven to show positive results? Absolutely, it has! "Over the years, studies have shown that when students are actively, or more succinctly, "interactively," involved in a lecture, classroom discussion or self study, their learning and retention increases by as much as 20%" (Secure Edge Networks, 2011). Students are not only more comfortable within these environments, but have shown an improved education. Interaction and collaboration within the classroom has been an interesting topic of concern in the last decade. I have researched some precedent studies that design more effective interactive learning environments.

Harbor City International School
Duluth, Minnesota

Harbor City experimented with a design that consisted of a variety of spaces. Their learning environment focused on the concept of "community". Space that was once used for circulation and corridors was transformed into student workstations and breakout areas. They found social learning to be an essential asset to the school and, therefore, designed many breakout spaces for gathering, studying, and eating lunch. Scalzo Architects developed an efficient design that used the same square footage of a traditional classroom and corridor and reconfigured it to create a much more open and flexible space. This way, all space has the opportunity for learning. In Figure 1.4, you will see the layout of the classroom designed with individual workstations, a café and lounge for relaxing, a "quiet team area", a library, a breakout space for the teachers, a presentation forum, a media lab, an art room, and a science lab. Their motive was to create creative connections and skills that students might not acquire in a traditional classroom. *(Fielding, 2005)*

Fort Herriman Middle School
Herriman, Utah

At Herriman Middle School a series of student learning communities were developed along a "learning street." Each of these streets has learning studios, a central multi-purpose space, teacher breakout spaces, and outdoor access. Spaces were organized by hierarchy instead of packing all of the spaces into a traditional classroom block. The configuration of spaces is very flexible to provide the opportunity for private

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spaces and communal spaces. Within each learning street, a comfortable community is formed and the students are familiar with all of their peers and teachers.

Figure 1.5: Fort Herriman classroom (Fielding, 2005)

Improved Methods

As new interactive technologies and programs emerge, the role of the environment becomes even more important. New learning environments are not designed to replace all traditional classrooms and lecture halls, but simply provide more options. By researching classroom designs of the past and present, I have developed an idea of how I would design an educational facility. The classrooms would focus on flexibility, interaction, and observation. Providing a variety of spaces allows for the students to be intentional about their work. Specific spaces should be designed for specific functions in order for the classroom to work successfully.

I was able to personally investigate these design concepts through the development of diagrams and physical models. I had the opportunity to become engaged in a competition project that was proposing for an elementary school in Portland, Oregon. I was supplied with a program of their requirements of spaces and an overall design intent for their vision of the school. With that, I was able to develop my own design of the elementary school. The following text, supporting diagrams, and photos will show the framework for the final product of this research investigation.

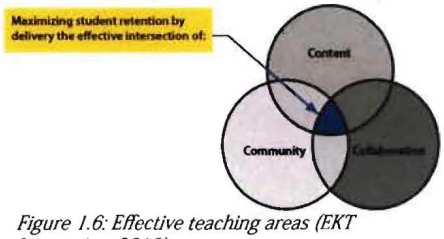


Figure 1.6: Effective teaching areas (EKT Interactive, 2010)

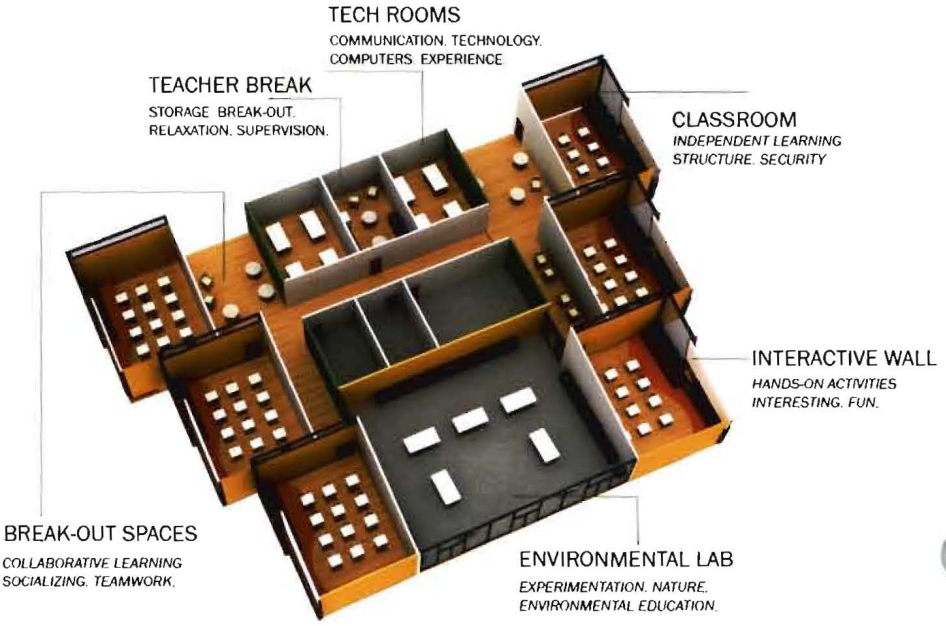


Figure 1.7: Rendered diagram of developed Classroom Pod

Portland Elementary School: Concept Summary

Portland Elementary School becomes a teaching tool with the building itself. A system of visible processes allows the students to become more familiar with their surroundings and begin to learn what is going on with their design of their school. Portland Elementary broadens its curriculum with the addition of specialized environmental education. Nature plays an important role on not only the exterior environment, but also the interior of this school. Through observational learning, the students' experiences with these passive and built processes will greaten. Living walls are integrated into the atrium and cafeteria to bring a sense of nature and science into these main spaces. Interactive learning will also allow the students to physically manipulate their learning setting. They will be able to adapt their spaces to fit their individual needs with interactive learning walls in each classroom. These walls provide built-in shelves for storage and play. Display windows allow for seating and a place to present plants or projects.

Classrooms are organized into "classroom pods". This allows for a cluster of varied spaces to be located near each other. Each classroom pod is designed to accommodate independent and collaborative learning. Classrooms provide a space for independent learning with some interaction, while the break-out spaces provide a more comfortable, social atmosphere for group thinking. Natural ventilation, daylighting, and water catchment occur in each of the classroom pods, diagramming and exposing their form and process to the students. Learning comes from the design of the building through color and structure.

"The learning environment is not a passive backdrop. It can distract or focus attention, impede or inspire learning, prevent or promote progress. It can transform a static, passive state into a dynamic, active mental pursuit for knowledge." (Steelcase, 2000)

Specialized Spaces (refer to Figure 1.7 on previous page)

Break-out Spaces:

This area provides privacy in the larger context of the classroom layout. Smaller groups may want to separate themselves from the majority of the group in order to work efficiently, so they move to the breakout space. Breakout spaces can be integrated into classroom pods or even into lecture halls and may provide space for activities, such as, presentations, note-taking, class discussions, or small group projects. The furniture is designed to move easily for the different arrangements and groups of students.

Figure 1.8: "Breakout Space" (Burt Hill, 2010)

Tech Rooms:

Technology Pods are designed to enhance the relationship between children and technology within the classroom. This may be in the form of computers, laptops, or Smart Boards. Here, the students can connect to surrounding pods as way of the internet. This strategy may also provide the interaction throughout the community or even throughout the country. The children are provided a space to escape to from the classroom. Technology is an ever-advancing science that should be greatly considered when designing a classroom.

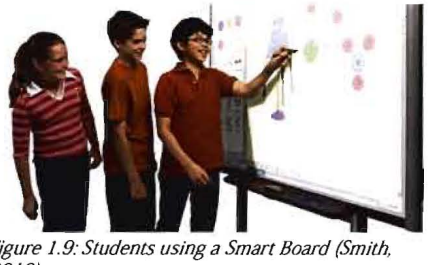


Figure 1.9: Students using a Smart Board (Smith, 2010)

Project Room/Environmental Lab:

Hands-on activities are extremely important within the classroom, especially for kinetic learners. This space will provide a larger area for projects and experiments. Activities that require a majority of space and materials can be assembled here. In some cases, for example, if the school specializes in environmental education, they can grow plants here. The labs create a great atmosphere for science classes and science experiments. This room would most likely have an open layout of work stations with a great amount of counter space. Students are able to utilize the amount of space that they need to successfully finish their work.

"One Size Does Not Fit All"

This investigation has allowed me to think outside traditional design methods and focus on a scheme that may be more successful for future classrooms. After examining a variety of classroom settings it is very evident that one size does not fit all. Classrooms must adapt to new technologies, interests and needs of the children, and specific environmental concerns. We must continue to evolve with these ever-changing designs so that we can develop with this movement.

"The great aim of education is not knowledge, but action." ---Herbert Spencer (ThinkExist.com)

Designers, students, professors, and any other individuals in this related area each hold an important role in the functioning of their school. Individuals in any of these positions can work to improve the design of their school by simply raising a problem or introducing an innovative proposal. We have all experienced the effects of classrooms at some point in our lives, allowing each of us to be able to formulate our own opinion on successful learning environments. This experience also allows you to become involved in this project study. With this creative project I hope that you have learned about the positive effects of interactive and collaborative learning and their importance within educational environments. I would like to encourage you to analyze your current or past learning environments in regards to spatial organization, seating arrangement, and the overall opportunity for interaction. It is important to understand that a school can become more than just a building, but a teaching tool as well.

Figure 1.10: Computer rendering of classroom design. (Note: Interactive Wall)

FINAL PRESENTATION MATERIALS:
BOARD LAYOUT OF DRAWINGS AND PHYSICAL MODEL

Figure 1.11: Model image of classroom pod

My final presentation consists of a digital model that I used to render my drawings. These drawings were then arranged onto a 20" x 80" board to present my ideas in the competition. I also used my digital model to make "cut sheets" for the laser cutter in the College of Architecture and Planning Building. This allowed me to cut precise pieces to assemble my physical model with. People, desks, chairs, and plants were added to the model to bring the classroom to life and provide a sense of scale for the viewers.

Figure 1.13: Model image of individual classroom

Figure 1.14: Classroom with view of living wall in atrium

Figure 1.12: Final graphic presentation of drawings

Figure 1.15: View of "Tech Pod" and hallway

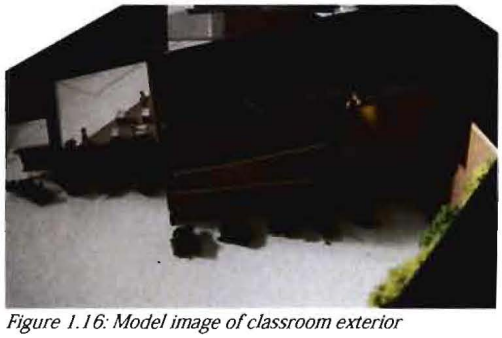
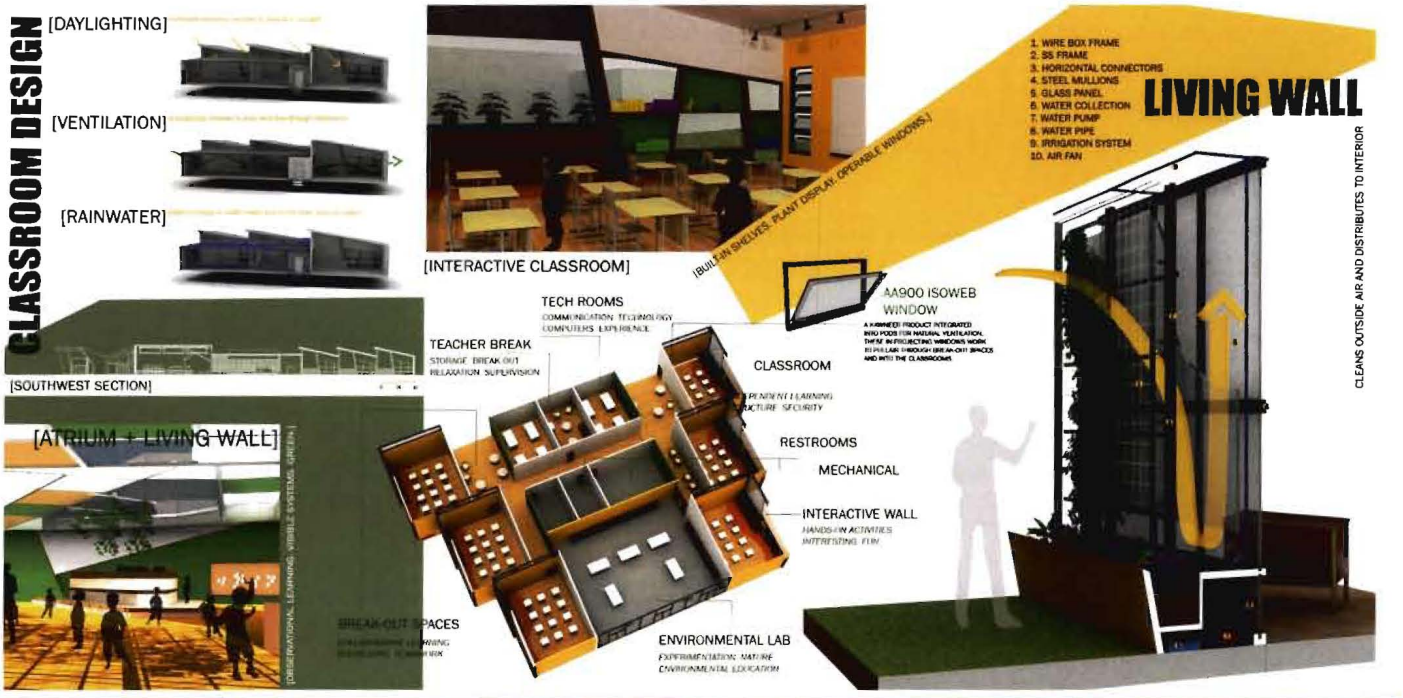


Figure 1.16: Model image of classroom exterior

Figure 1.17: Model of Portland Elementary at 1/32"=1' and classroom pod at 1/8"=1'



WORKS CITED:

Burt Hill. "Doherty Hall: A celebration of science and engineering." 2010. Retrieved 3 May 2011 from http://www.burthill.com/FILES/stories/CMU_chemE_group_space.jpg

Cox, Brad. "Interactive Learning Environment." *Virtual School.* 2004. Retrieved 21 January 2011 from http://www.virtualschool.edu/ile/

EKT Interactive. "Custom Training." 2010. Retrieved 3 May 2011 from http://www.ektinteractive.com/images/student-retention.jpg

Fielding, Randall. "Small is Big: Breaking down schools to break down barriers." *Edutopia.* October 2005. Retrieved 20 January 2011 by http://www.edutopia.org/small-big

Hunley, S. "Assessment: The key to creating spaces that promote learning." *Educause.* April 2009. Retrieved 20 March 2011 from http://www.educause.edu/EDUCAUSE+Review/EDUCAUSEReviewMagazineVolume44/AssessmentTheKeytoCreatingSpac/163797

Lockton, Dan. "Design with Intent." 2011. Retrieved 3 May 2011 from http://architectures.danlockton.co.uk/architectures-of-control-in-the-built-environment/

Secure Edge Networks. "Interactive Learning." 2011. Retrieved 3 May 2011 from http://www.securedgenetworks.com/wireless-network-solutions/interactive-learning/

Smith. "My Experience and Opinions on Smart Boards." April 2010. Retrieved 3 May 2011 from http://3.\bp.blogspot.com/-JSyKTX8i5YM/TaiBplYrj1I/AAAAAAAAACA/MRvB-YFdjIg/s1600/smartboard.jpg

Spencer, Ben. "The Built Environment: Learning from every angle." *360°.* June 2004. Issue 4. Retrieved 12 January 2011 from http://www.cabe-education.org.uk

Steelcase. "Learning Environments for the Information Age." March 2000. Retrieved 20 January 2011 from http://360.steelcase.com/issues/

ThinkExist.com. "Herbert Spencer Quotes." 2010. Retrieved 3 May 2011 from http://thinkexist.com/quotation/the_great_aim_of_education_is_not_knowledge-but/198665.html